

REMARKS/ARGUMENTS

Status of the Application:

Enclosed herewith is a Petition under 37 CFR 1.137(b) to revive this application as being unintentionally abandoned.

Status of the Drawings:

The drawings are objected to for the reasons stated in the Office communication.

Status of the Priority Claim:

The Examiner has acknowledged that a certified copy of the priority application has been filed to claim the benefit of a priority under 35 USC §119(a)-(d) and 35 USC §120. (Note: this application is a continuation application under 35 USC 120 of PCT/FR98/02599 filed December 2, 1998 which designated the US and, in turn, claims the benefit of a priority under 35 USC §119(a)-(d) to French Patent Application No. 97 15639 filed December 10, 1997.)

Status of the Information Disclosure Statement:

The Examiner has acknowledged in the Office communication mailed 02/03/2000 the filing of an Information Disclosure Statement.

Status of the Claims:

Claims 1 to 15 and 17 to 20 are pending in the application. Claims 1 to 15 and 17 to 20 are rejected under 35 U.S.C. §101. Claims 1 to 15 and 17 to 20 are rejected under 35 USC §112, first paragraph and under 35 USC §112, second paragraph, as being indefinite for the reasons indicated in the office action. Claims 1 to 15 and 17 to 20 are rejected under 35 USC §102(b) as being anticipated by Tata et al. or Bala et al. Claims 1 to 15 and 17 to 20 are rejected under 35 USC §102(e) as being anticipated by Hoppe or Akiyama or Sakaguchi et al. No claim is indicated as reciting allowable subject matter

Status of the Drawings:

The applicant traverses the objection to the drawings. It is believed that every feature of the method claims is illustrated to the extent required by 35 USC §§112 and 113 and 37 CFR 1.83 and the MPEP. Title 35, Section 113 (and similarly 37 CFR 1.81(a)

provides that an “applicant shall furnish a drawing where necessary for an understanding of the subject matter to be patented. MPEP 601.01(f) states: “It is has been USPTO practice to treat an application that contains at least one process or method claim as an application for which a drawing is *not* necessary for an understanding of an invention under 35 USC §113 (first sentence) (emphasis added). Similarly MPEP 608.02 The present application contains only process or method claims. 37 CFR 1.81(b) states further: “Drawings *may* include illustrations which facilitate an understanding of the invention (*for example*, flow sheets in cases of process...” (emphasis added). There is no mandatory format for satisfying 35 USC §113 and 37 CFR 1.81 or 1.83. The drawings submitted provide, together with the description, an understanding of the invention. The application as filed show geometric features corresponding to the features recited in the method claims. A showing of the geometric features is sufficient for one skilled in the art to understand and practice the invention and to comply with 35 USC §113 and 37 CFR 1.81 and 1.83. The claimed invention is directed to geometric subdivision. The drawing shows and illustrates geometric subdivision. Further, the objection under 37 CFR 1.83 (a) is inadequately worded. The examiner has failed to identify what features of the claims are not “shown” – see MPEP 608.02(d), ¶ 6.36.

In view of the above remarks/arguments the Examiner is respectfully requested to withdraw the objection to the drawings and to find that the drawings pending in the application are acceptable.

Rejection of Claims 1-15 and 17-20 Under 35 USC § 101

The applicant traverses the rejection of any or all claims under 35 USC §101 as contrary to any current legal requirement. The present invention is a method, typically a method carried out by a computer program, an algorithm. As such, the class of the invention is permissible subject matter under 35 USC §101. The entire analysis provided by the Examiner is based on case law directed to methods as a computer program decided prior to 1998 (*Diehr* is a US Supreme Court decision of 1991 and *Warmerdam* is a CAFC decision of 1994) The Examiner’s analysis is incorrect and inappropriate for the subject

of the present application. *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998), *cert. denied*, 119 S. Ct. 851 (1999) and *AT&T Corp. v. Excel Communications, Inc.*, (172 F.3d 1352 (Fed. Cir. 1999), held that a method directed to an algorithm or computer program is statutory subject matter if it is applied in a “useful” manner. Further, the description of the invention is directed to medical imagery – see page 1, lines 1 to 5 – that *per se* defines utility, “useful” manner. It is self-evident to one skilled in the art that the images for medical imagery can be acquired from several known method, e.g., CT, MR, X-ray, etc. and in fact, any image acquisition that produce volume data sets. The description as filed indicates that the knowledge of the volume of the object, such as a body organ, is desirable and there are existing methods for estimating such a volume. It is self-evident to one skilled in art, such as many medical practitioners, who may require accurate measurements of the volume of an organ, e.g., assessing tumor or organ growth or response to therapy or grafts or organ transplants or transplant receiving sites. For example, radiologists and oncologists, require such volume measurements to determine diagnosis and treatment evaluation by follow-up of volume during therapy. The currently used method assumes that the object of interest is oval shaped. This permits classification of patients into at least three groups: regression of pathology (volume decreases of more than 50%); stagnation of pathology (between 50% decrease and 50% increase of volume); and aggravation of pathology (volume increase of more than 50%). The present invention permits a tangible, concrete result: a more precise volume determination; less subjective and easier, faster and more efficient to implement and permits great user control of the process. In addition to utility *per se* in medical diagnostic imaging (for both human and animal bodies), it is self-evident to one skilled in the art that the disclosed invention has utility in non-destructive testing. For example, CT and X-ray images have been used to determine the quality of cast and molded products or articles. The present invention may be useful in the determination of the extent, shape and volume of voids or cavities in such products or articles in their manufacture or during use.

In summary, a claim for process reciting a series of steps, is permissible subject matter under 35 USC §101, so long as method is transformative of something, in some manner, i.e., it accomplishes something other than merely appropriating an algorithm or manipulating numbers. All of the pending claims satisfy this requirement.

In view of the above remarks/arguments the Examiner is respectfully requested to withdraw the rejection of claims 1 to 15 and 17 to 20 under 35 USC §101 and to find the claims allowable.

Rejection of claims 1 to 15 and 17 to 20 under 35 USC §112, first paragraph:

The applicant traverses the rejection of any or all claims under 35 USC §112, first paragraph, for the following reasons. The above remarks are fully responsive to Examiner's observation that the claimed invention is not supported by either an asserted utility or a well-established utility or that one skilled in the art would not know how to use the claimed invention. Further, the above remarks are fully responsive to the Examiner's observation regarding details directed to obtaining and using images. In addition, the entire contents of the amendments of July 25, 2001 and September 25, 2000 are hereby incorporated to avoid repetition. The description as filed refers to medical imagery and a contour of an object being known by means of a plurality of films, i.e., images, taken in section, and further identifies X-ray imagery as one source of images.

In view of the above remarks/arguments the Examiner is respectfully requested to withdraw the rejection of claims 1 to 15 and 17 to 20 under 35 USC §112, first paragraph and to find the claims allowable.

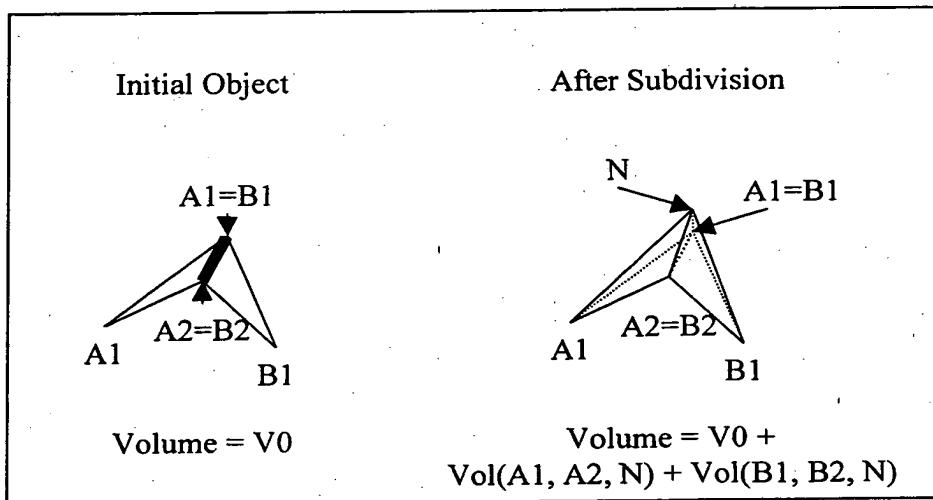
Rejection of claims 1 to 15 and 17 to 20 under 35 USC §112, second paragraph:

The applicant traverses the rejection of any or all claims under 35 USC §112, second paragraph, for the following reasons. In regard to calculating the volume, it is first noted that one skilled in the art, particularly one skilled in computer graphics, knows that any three-dimensional volume described by a three-dimensional grid is a plurality of two-dimensional images; and that a description of a volume by its polygonal surface will

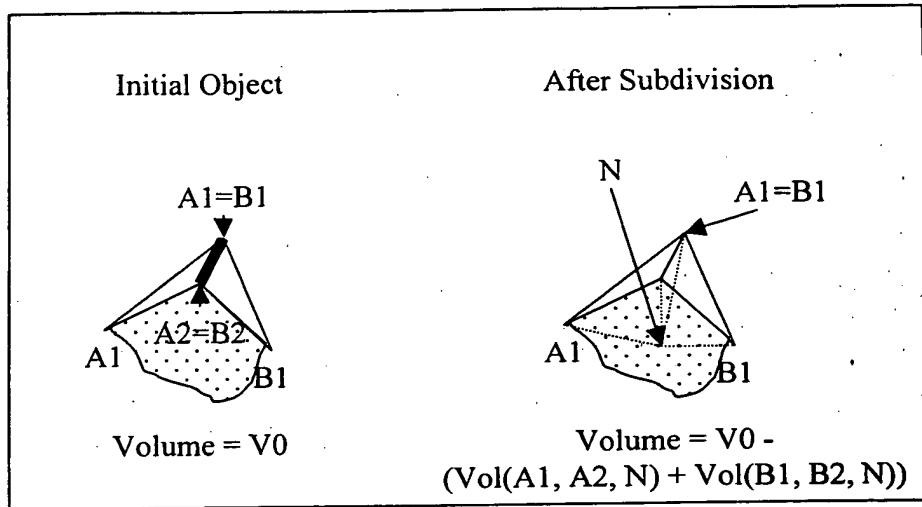
directly yield a volume measurement. The Examiner appears to assume (from the rejection under 35 USC §§102(b) and 102(e)) that it is not novel to compute a volume from tessellating (iteratively refining the mesh to a contour). What the Examiner has not considered is how difficult it is to actually define the object by this set of polygons, which is the problem to which an embodiment of the invention is directed. This difficulty is exemplified by the prior art cited by the Examiner and recited in the Information Disclosure Statement. There is a considerable amount of prior art on the computation of volume from a set of tetrahedral (which is what an embodiment of the disclosed invention produces). The formula for computing the volume of a specific tetrahedron is known as Piero Della Francesca's formula and dates back to the 15th century. Another and simpler formula, which is part of the standard French mathematical requirements for 18 year old students, is as follows, if one considers the triangle formed by three points:

$$V_t = \text{triangle_area} \times \text{height_of_4}^{\text{th}} \text{ point_w_respect_to_triangle}/3$$

The volume of the initial point set can thus be very dimly determined. One can then update the resulting volume with each subdivision step occurring within the step of creating second rank points or the step of defining third or more rank points. When a new point is created. When a new point is created, then we will:



- A: if the new point is outside the initial volume, add the volume of the two new tetrahedrons that were created as a difference from the initial polyhedron.



B: if the new point is inside the initial volume, then the above volume is subtracted from the volume before the subdivision.

In paragraph 10 of the Office communication, the rejection of any or all claims under 35 USC §112, second paragraph, is further traversed for the following reasons. The Examiner alleges that there is omission of essential steps in the independent claim but there is no recitation as what are these "steps". The applicant requests clarification of the alleged gap between tessellating and volume calculation.

In view of the above remarks/arguments the Examiner is respectfully requested to withdraw the rejection of claims 1 to 15 and 17 to 20 under 35 USC § 112, second paragraph and to find the claims allowable.

In paragraph 11 of the Office communication, the Examiner's claim interpretation is correct.

The rejection of any or all claims under 35 USC §§101 or 112, first or second paragraphs, deserves additional remarks in view of the status of the French priority application No. 97 15639 filed December 10, 1997 and the corresponding European Patent Application No. 98 958 308.3, filed December 2, 1998 in the European Patent Office. The French and the European patent applications and the instant US patent

application have common inventors and common assignee. The US application is based on a priority filed French application. The subject matter disclosed and claimed in the present US application is the same as that disclosed and claimed in the French priority application. Similarly, the subject matter disclosed and claimed in the corresponding European patent application is the same as that disclosed and claimed in the French priority application. Both the French Intellectual Property Code (at L.611 and L.612) and the European Patent Convention (at Art. 52 and Art. 83) require that a disclosed invention have "industrial application", which for present purposes is equivalent to the US requirement of "utility", and have a description that is sufficiently clear and complete for it to be carried out by a person skilled in the art. The French Intellectual Property Code, like the European Patent Convention, excludes *as such* patentable subject matter directed to mathematical methods and programs for computers; and diagnostic methods practiced on the human or animal body are not regarded as inventions that are susceptible of industrial application if the claim results in a diagnosis. Neither INPI (the French Patent Office) nor the European Patent Office has rejected or objected to the subject matter of the present invention as lacking "industrial application" or failing to disclose the invention as indicated above. Neither INPI nor the European Patent Office has rejected any claim as filed as lacking novelty or being obvious over cited prior art. The claims as filed in the French and European Patent applications recite the same subject matter as the claims in the present US application. The criteria for disclosure and permissible subject matter under the French Intellectual Property Code and the European Patent Convention is more restrictive than that of Title 35 and yet *the claims as filed in the French and European Patent applications have been allowed as filed.*

Rejection of claims 1 to 15 and 17 to 20 under 35 USC §102(b) as being anticipated by Tata et al. or Bala et al.

The rejection of claims 1 to 15 and 17 to 20 under 35 USC §102(b) as being anticipated by Bala et al. or Tata et al. is respectfully traversed for the following reasons.

"[T]he dispositive question regarding anticipation [I]s whether one skilled in the art would reasonably understand or infer from the [prior art reference's] teaching that *every claim element* was disclosed in that single reference. *In re Baxter Travenol Labs, Inc.*, 952 F2d 388, 390, 21 USPQ2d 1281, 1284 (Fed. Cir. 1991); see also *Schumer v. Lab. Computer Sys., Inc.* 308 F2d 1304, 1315, 64 USPQ2d 1832, 1841 (Fed. Cir. 2002) (emphasis added). The rejection over Bala et al. or Tata et al. fails to meet this criterion.

Claim 1, as amended, recites as a claim feature that a first three-dimensional shape defined by three segments. Claim 1 recites as a claim feature that each segment is divided so as to constitute a second three-dimensional shape such as to create at least three new segments. Claim 1 recites as a claim feature that each such segment is further iteratively divided into subsegments. Bala et al. does not subdivide segments. Bala et al. repeatedly recites subdividing volume elements. Tata et al. does not divide or subdivide line segments. In Bata et al. the only "division" of segments or is by slicing for identification and not for further processing to form additional segments.

Claims 2 to 15 and 17 to 20 are each dependent on claim 1 and are patentable over Tata et al. or Bala et al. for the same reasons as claim 1.

Applicant further traverses the rejection of claims 1 to 15 and 17 to 20 as being anticipated under 35 USC §102(b) over Bala et al. or Tata et al. for the following reason. In order to establish a *prima facie* basis for any rejection over cited prior art, the Examiner is required to substantiate that all the claim features are disclosed in the cited prior art and how and where in the cited prior art the claimed features are disclosed. The Examiner has not met this standard of examination. The basis of the Examiner's "application" of the cited prior art to the claimed features is merely the copying into the Office communication the entirety of the Abstract of Bala et al. or Tata et al.

In view of the above remarks/arguments the Examiner is respectfully requested to withdraw the rejection of claims 1 to 15 and 17 to 20 under 35 USC §102(b) over Tata et al. or Bala et al. and to find the claims allowable.

Rejection of claims 1 to 15 and 17 to 20 under 35 USC §102(e) as being anticipated by Hoppe

The rejection of claims 1 to 15 and 17 to 20 under 35 USC §102(b) as being anticipated by Hoppe is respectfully traversed for the following reasons.

“[T]he dispositive question regarding anticipation [I]s whether one skilled in the art would reasonably understand or infer from the [prior art reference’s] teaching that *every claim element* was disclosed in that single reference. *In re Baxter Travenol Labs, Inc.*, 952 F2d 388, 390, 21 USPQ2d 1281, 1284 (Fed. Cir. 1991); see also *Schumer v. Lab. Computer Sys., Inc.* 308 F2d 1304, 1315, 64 USPQ2d 1832, 1841 (Fed. Cir. 2002) (emphasis added). The rejection over Hoppe fails to meet this criterion.

Claim 1, as amended, recites as a claim feature that a first three-dimensional shape defined by three segments. Claim 1 recites as a claim feature that each segment is divided so as to constitute a second three-dimensional shape such as to create at least three new segments. Claim 1 recites as a claim feature that each such segment is further iteratively divided into subsegments. Hoppe does not divide or subdivide segments. Neither the steps of mesh transformation by “vertex split transformation” or “edge collapse operations”, as disclosed by Hoppe, provides for the dividing or subdividing of segments of subsegments as recited in claim 1.

Claims 2 to 15 and 17 to 20 are each dependent on claim 1 and are patentable over Hoppe for the same reasons as claim 1.

Applicant further traverses the rejection of claims 1 to 15 and 17 to 20 as being anticipated under 35 USC §102(e) over Hoppe. for the following reason. In order to establish a *prima facie* basis for any rejection over cited prior art, the Examiner is required to substantiate that all the claim features are disclosed in the cited prior art and how and where in the cited prior art the claimed features are disclosed. The Examiner has not met this standard of examination. The basis of the Examiner’s “application” of the cited prior art to the claimed features is merely the copying into the Office communication the entirety of the Abstract of Hoppe.

In view of the above remarks/arguments the Examiner is respectfully requested to withdraw the rejection of claims 1 to 15 and 17 to 20 under 35 USC § 102(e) over Hoppe and to find the claims allowable.

Rejection of claims 1 to 15 and 17 to 20 under 35 USC §102(e) as being anticipated by Akiyama.

The rejection of claims 1 to 15 and 17 to 20 under 35 USC §102(e) as being anticipated by Akiyama is respectfully traversed for the following reasons.

"[T]he dispositive question regarding anticipation [I]s whether one skilled in the art would reasonably understand or infer from the [prior art reference's] teaching that *every claim element* was disclosed in that single reference. *In re Baxter Travenol Labs, Inc.*, 952 F2d 388, 390, 21 USPQ2d 1281, 1284 (Fed. Cir. 1991); see also *Schumer v. Lab. Computer Sys., Inc.* 308 F2d 1304, 1315, 64 USPQ2d 1832, 1841 (Fed. Cir. 2002) (emphasis added). The rejection over Akiyama fails to meet this criterion.

Claim 1, as amended, recites as a claim feature that a first three-dimensional shape defined by three segments. Claim 1 recites as a claim feature that each segment is divided so as to constitute a second three-dimensional shape such as to create at least three new segments. Claim 1 recites as a claim feature that each such segment is further iteratively divided into subsegments. Akiyama does not divide or subdivide segments. In Akiyama one of the vertices of a triangle becomes a moving node to identify a projected point. A determination is made whether the projected point is within a circle that circumscribes a peripheral triangle.

Claims 2 to 15 and 17 to 20 are each dependent on claim 1 and are patentable over Akiyama for the same reasons as claim 1.

Applicant further traverses the rejection of claims 1 to 15 and 17 to 20 as being anticipated under 35 USC §102(e) over Akiyama for the following reason. In order to establish a *prima facie* basis for any rejection over cited prior art, the Examiner is required to substantiate that all the claim features are disclosed in the cited prior art and how and where in the cited prior art the claimed features are disclosed. The Examiner has

not met this standard of examination. The basis of the Examiner's "application" of the cited prior art to the claimed features is merely the copying into the Office communication the entirety of the Abstract of Akiyama.

In view of the above remarks/arguments the Examiner is respectfully requested to withdraw the rejection of claims 1 to 15 and 17 to 20 under 35 USC §102(e) over Akiyama and to find the claims allowable.

Rejection of claims 1 to 15 and 17 to 20 under 35 USC §102(e) as being anticipated by Sakaguchi et al.

The rejection of claims 1 to 15 and 17 to 20 under 35 USC §102(e) as being anticipated by Sakaguchi et al. is respectfully traversed for the following reasons.

"[T]he dispositive question regarding anticipation [I]s whether one skilled in the art would reasonably understand or infer from the [prior art reference's] teaching that *every claim element* was disclosed in that single reference. *In re Baxter Travenol Labs, Inc.*, 952 F2d 388, 390, 21 USPQ2d 1281, 1284 (Fed. Cir. 1991); see also *Schumer v. Lab. Computer Sys., Inc.* 308 F2d 1304, 1315, 64 USPQ2d 1832, 1841 (Fed. Cir. 2002) (emphasis added). The rejection over Sakaguchi et al. fails to meet this criteria.

Claim 1, as amended, recites as a claim feature that a first three-dimensional shape defined by three segments. Claim 1 recites as a claim feature that each segment is divided so as to constitute a second three-dimensional shape such as to create at least three new segments. Claim 1 recites as a claim feature that each such segment is further iteratively divided into subsegments. The block generating means of Sakaguchi et al. does not divide or subdivide segments.

Claims 2 to 15 and 17 to 20 are each dependent on claim 1 and are patentable over Sakaguchi et al.. for the same reasons as claim 1.

Applicant further traverses the rejection of claims 1 to 15 and 17 to 20 as being anticipated under 35 USC §102(e) over Sakaguchi et al. for the following reason. In order to establish a *prima facie* basis for any rejection over cited prior art, the Examiner is

required to substantiate that all the claim features are disclosed in the cited prior art and how and where in the cited prior art the claimed features are disclosed. The Examiner has not met this standard of examination. The basis of the Examiner's "application" of the cited prior art to the claimed features is merely the copying into the Office communication the entirety of the Abstract of Sakaguchi et al.

In view of the above remarks/arguments the Examiner is respectfully requested to withdraw the rejection of claims 1 to 15 and 17 to 20 under 35 USC §102(e) over Sakaguchi et al. and to find the claims allowable.

Applicant further traverses the rejection of claims 1 to 15 and 17 to 20 under 35 USC §§102(b) and 102(e) over Tata et al. or Bala et al. or Hoppe or Akiyama or Sakaguchi et al. for the following reasons. The rejections over the cited prior art are based in each instance that the claims lack novelty, i.e., anticipated. In this instance, there are five rejections over the cited prior art under the same statutory section. In the examination process the Examiner is obliged to select the most material and relevant prior art for consideration of the patentable merits of the claims. This basis for the rejection of claims 1 to 15 and 17 to 20 is excessive and duplicative.

Amendment to claims 1 to 15 and 17 to 20:

Claims 1 and 3 to 15, 17 and 18 have been amended to improve clarity and grammatical expression and to provide antecedent basis. Claims 2 and 19 have not been amended.

New Claims 21 to 25:

Claims 21 to 25 are added to further provide to the applicant a desired scope and extant of protection. The applicant has reinstated original claim 16 as new claim 23 for the following reasons. Original claim 16 recites that the distribution of density in the object in space is calculated. In the Office communication of 02/03/2000 the Examiner alleged that the application as filed does not support the subject matter of claim 16. Original claim 16 is directed to a calculation method step and not a structural feature.

Appln No. 09/368,201
Amdt. Dated December 28, 2004
Reply to Office Communication of 10/10/2001
Docket No.14XZ00047

This calculation is known to one skilled in the art: one would simply count the occurrence of given values inside the volume defined by the previous steps recited in the claim 1. The calculation itself is basic and can be found in most image analysis computer program packages. Searching for "volume histogram" on an Internet site, such as "Google", gives 1030 hits. It is therefore believed that original claim 16, now pending as new claim 23, fully supported in accordance with the knowledge of one skilled in the art as set forth in 35 USC §112.

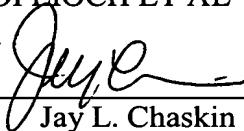
In addition, claim 21 to 25 are each dependent on claim 1 and are patentable over the cited prior art for the same reasons as claim 1. The Examiner is respectfully requested to find claims 21 to 25 allowable.

Applicant requests that a timely Notice of Allowance of claims 1 to 15 and 17 to 25 be issued in this application.

Respectfully submitted,

KNOPLIOCH ET AL

By



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